

National Aeronautics and
Space Administration



EXPLORE EARTH

Earth Science Division

2020 Senior Review Kickoff – Mission Team Q&A

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Senior Review Program Officers

December 8, 2019



WebEx Info

<https://nasaenterprise.webex.com/nasaenterprise/j.php?MTID=m23f1003608ab50db0c052b6e380de1ce>

Meeting number (access code): 902 909 573

Meeting password: mCye22J*

JOIN BY PHONE

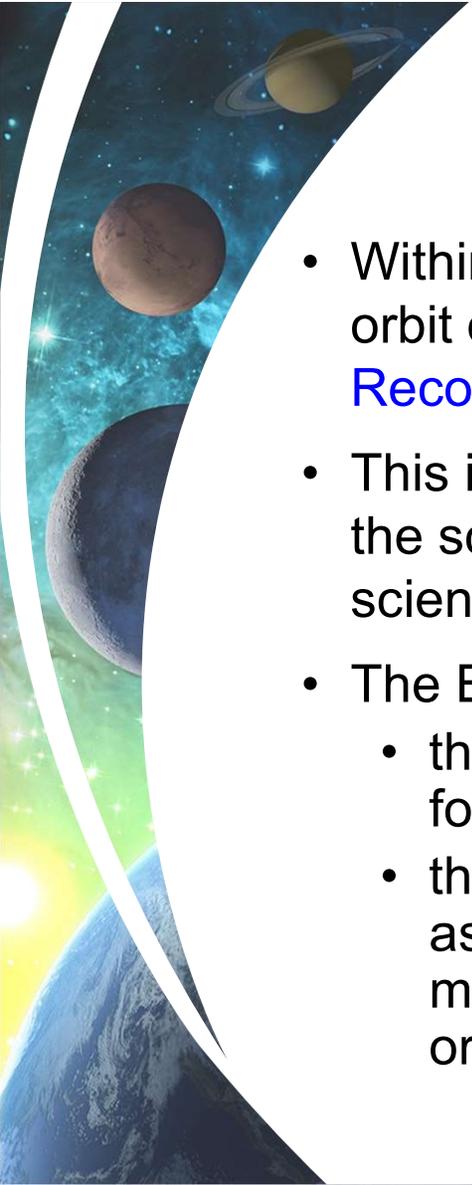
+1-415-527-5035 US Toll

Backup Audio Access: 1-844-467-6272, Passcode 668474



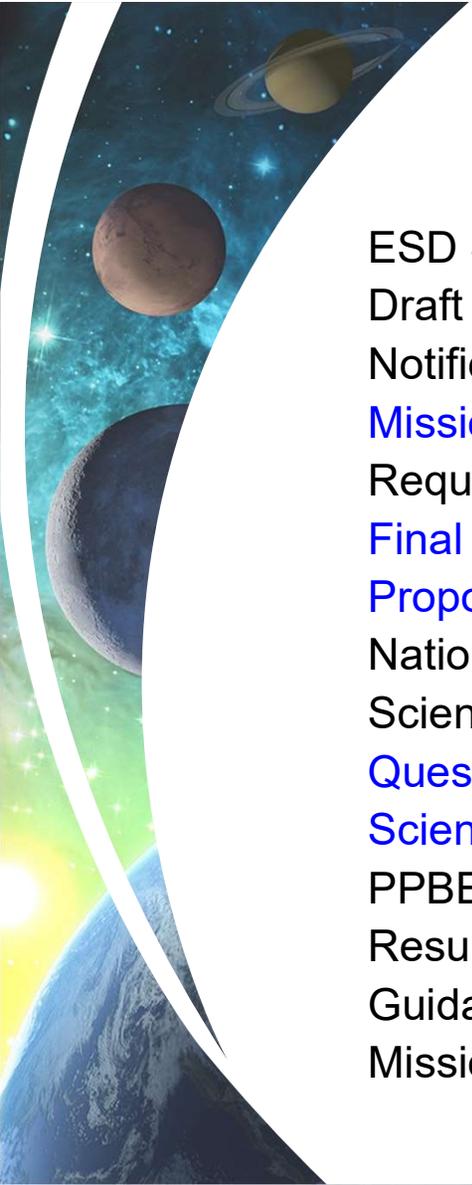
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 - Funding Environment
- Process Overview
- Call Letter Changes



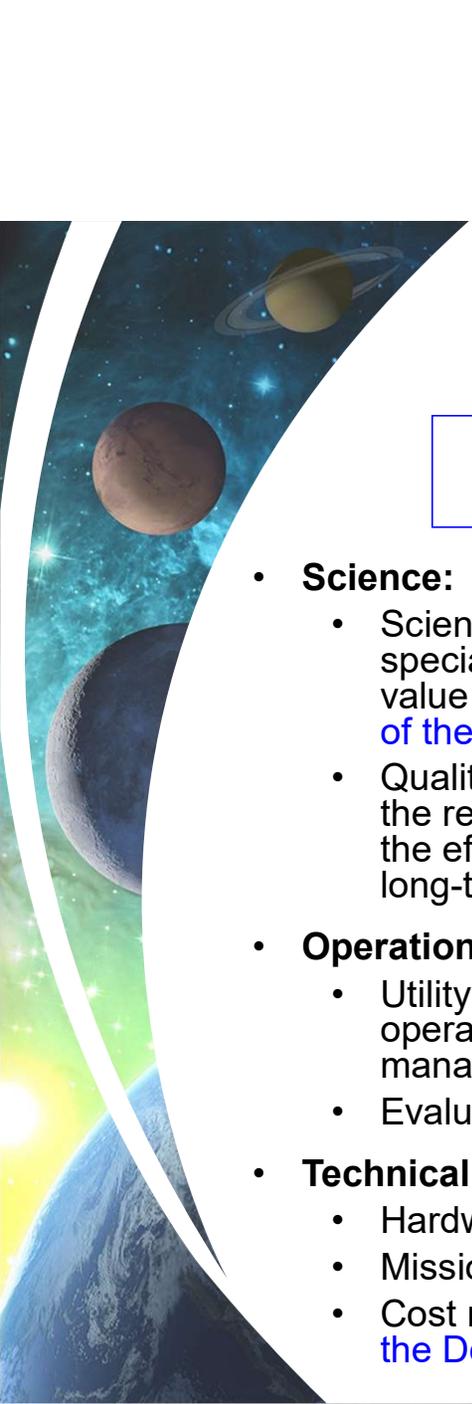
Senior Review Objective

- Within available resources, maximize science value of the ESD on-orbit observing assets, **within the constraints of the overall Program of Record and ESD's commitment to the Decadal Survey.**
- This is a comparative review in which the primary evaluation factor is the scientific value of the dataset, with attention to the value of science that will be enabled by the extension of the dataset.
- The ESD Senior Review explicitly acknowledges
 - the importance of long term data sets and overall data continuity for Earth science research;
 - the direct contributions of mission data to national objectives, such as the routine use of near-real-time products from NASA research missions for applied and operational purposes by U.S. public organizations.



Senior Review Schedule

ESD Steering Committee Kickoff	Nov 13
Draft Call Letter to Missions	Dec 3
Notification to excluded missions	Dec 3
Mission Scientists Pre-Proposal Briefing @ AGU	Dec 8
Request for Inclusion due from excluded missions	Dec 19
Final Call Letter	Dec 20
Proposals Due	Mar 6
National Interests Panel and Technical Review	Apr 14-16
Science Panel (Telecon)	Apr 21
Questions to the Mission Teams	Apr 24
Science Panel (Mission Presentations)	May 12-14
PPBE2022/Senior Review Budget Decisions	May – Aug
Results to ESD Steering Committee	Aug
Guidance Letters to Missions	Aug
Mission Response	Sep 30



Evaluation Criteria

ESD's priority for the Mission Teams for the 2020 Review:

➤ *Relevance of the Extended Mission to the 2017 Decadal Survey*

- **Science:**

- Scientific merit of the mission datasets with the proposed years of additional data collection, with special attention to the science that will be enabled by extension. Merit is based on their intrinsic value in research investigations by the community, [relevance to Decadal Survey](#), and [uniqueness of the data among the global observing resources](#);
- Quality trends of the standard data products, with a focus on the projected quality for the years of the requested extension, including any change induced by sensor, platform or orbit changes, and the effect of such changes on the overall consistency of the dataset, recognizing the value of long-term data records;

- **Operational and non-research uses:**

- Utility of the products for “applied and operational uses” that serve national interests, including operational uses, public services, business and economic uses, military operations, government management, policy making, etc.
- Evaluation factors: intrinsic value, frequency of use, latency.

- **Technical & Cost:**

- Hardware status and performance, life expectancy.
- Mission operations plans for health, safety and data collection.
- Cost realism, [and share of the overall budget projected for the Program of Record as specified in the Decadal Survey](#)

NASA EARTH FLEET

OPERATING & FUTURE THROUGH 2023



INVEST/CUBESATS

- RAVAN
- RainCube
- CSIM
- CubeRRR
- TEMPEST-D
- CIRiS
- HARP
- CTIM
- HyTI
- SNoOPI
- NACHOS

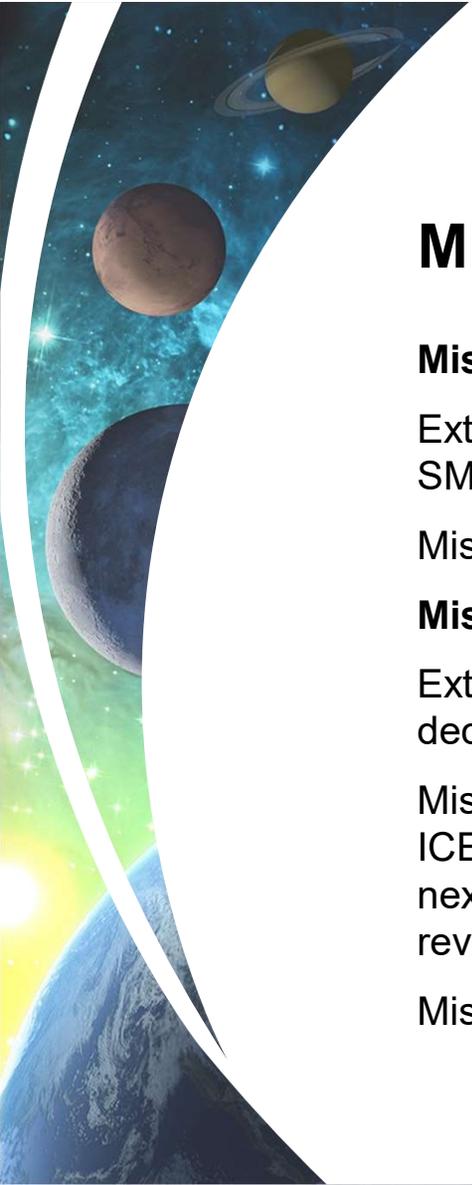
- (PRE) FORMULATION ●
- IMPLEMENTATION ●
- PRIMARY OPS ●
- EXTENDED OPS ●

ISS INSTRUMENTS

- EMIT
- CLARREO-PF
- GEDI
- SAGE III
- OCO-3
- TSIS-1
- ECOSTRESS
- LIS

JPSS-2, 3 & 4 INSTRUMENTS

- OMPS-Limb



Mission List: 13 missions in this year's Senior Review

Missions Included:

Extended missions invited to propose: Aqua, Aura, CALIPSO, CloudSat, GPM, OCO-2, SMAP, DSCOVR Earth Science Instruments, Terra

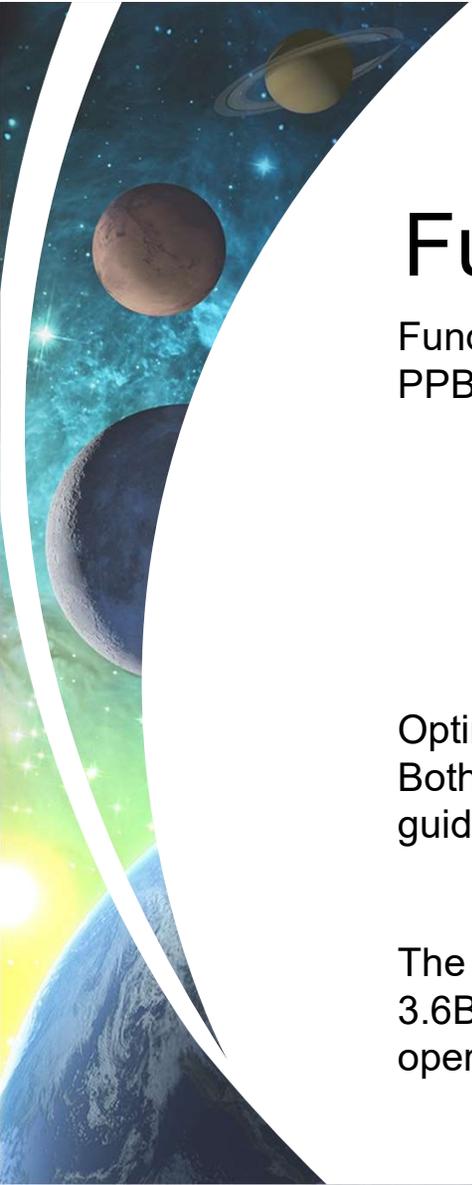
Missions new to the Senior Review process: CYGNSS, ECOSTRESS, LIS on ISS, SAGE III

Missions NOT included

Extended missions in operation NOT invited for further extension: SORCE (planned decommissioning), Landsat & Suomi NPP (operated by partners)

Missions scheduled to complete prime operations in 2021-2023: TSIS-1, GRACE-FO, ICESat-2, GEDI, OCO-3. These missions are expected to be given bridge extensions to the next Senior Review cycle, based on End of Prime Mission and/or out-of-cycle extension review results.

Missions operated by partners: Suomi-NPP, Landsat



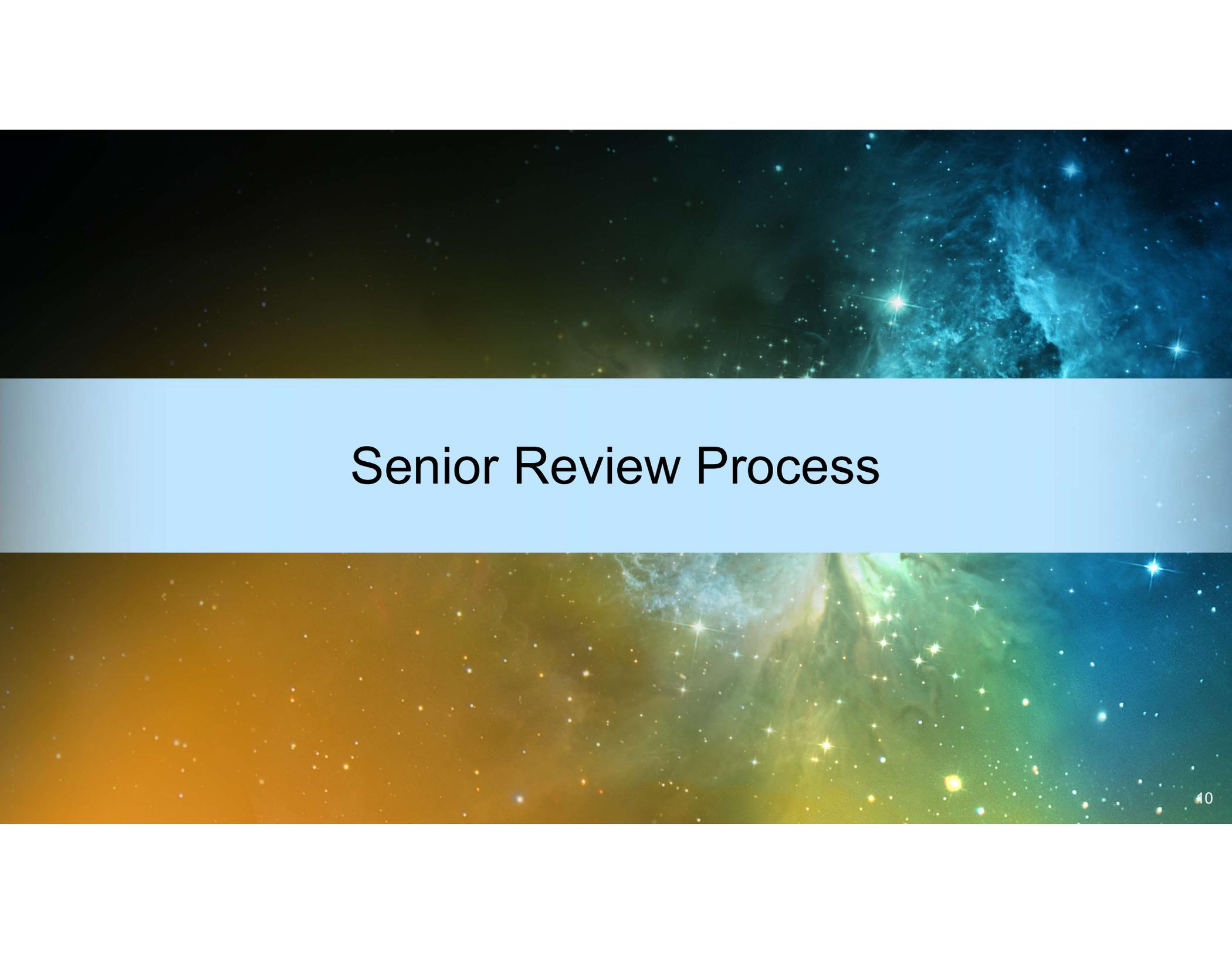
Funding Environment

Funding environment : 2020 review covers the budget years 2021-2026. (same as PPBE2022)

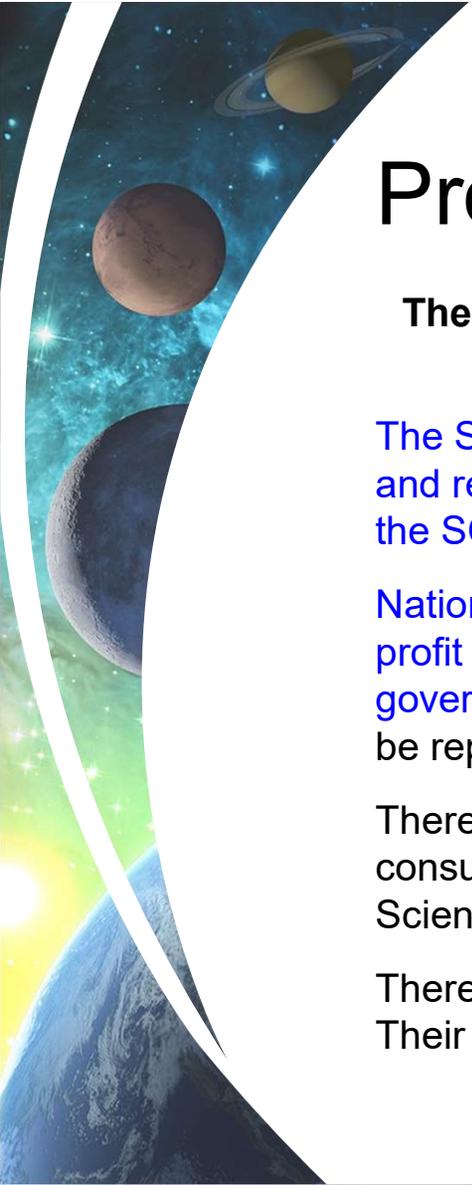
FY21	FY22	FY23	FY24	FY25	FY26
\$239M	\$213M	\$165M	\$140M	\$133M	\$133M

Optimal (Overguide) proposals are discouraged, but will be accepted and reviewed. Both Senior Review Proposals and PPBE submits must include in-guide and over-guide submissions, with clear identification/descriptions of the 2 options.

The 2017 Decadal Survey recommended capping the NASA Program of Record at 3.6B over the period 2018-2028; this cap is based on the Flight Budget for both the operating missions and missions in development.

The background of the slide is a composite of two cosmic images. The top half features a dark blue and black space filled with numerous small stars and a prominent, wispy blue nebula on the right side. The bottom half shows a similar starry field but with a warm, orange-to-yellow glow on the left side, transitioning into a greenish-blue glow on the right, with a bright, multi-colored nebula in the center-right.

Senior Review Process



Process Improvement: No Longer FACA

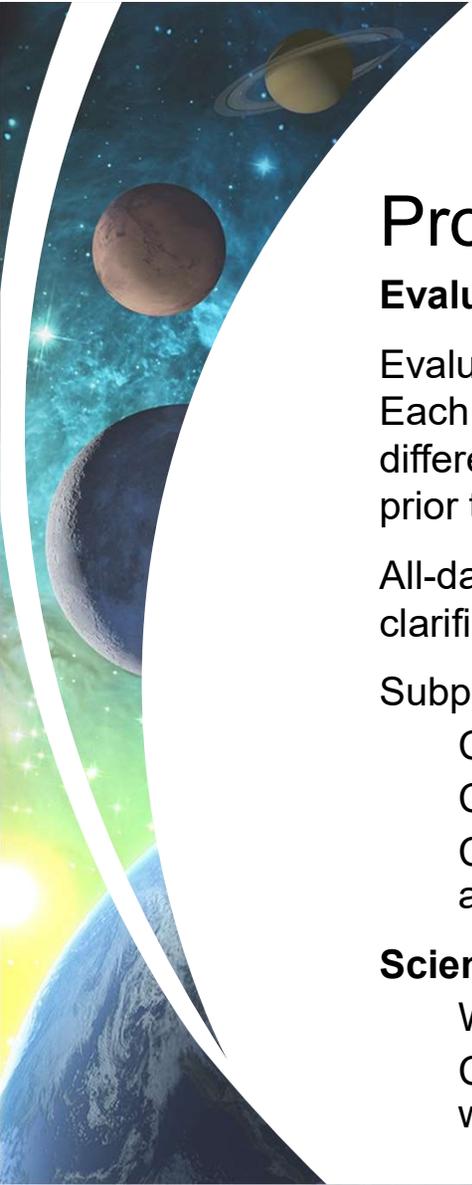
The Senior Review Process is no longer considered a Federal Advisory function.

The Senior Review panel will be paid consultants performing a non-consensus review and report their findings directly to ESD. The Panel will be selected and operated under the SOMA contract at LaRC which also handles AO reviews for SMD.

National Interests subpanel membership will (as in the 2009-2015 reviews) include non-profit organizations, non-governmental users, state and local governments. The non-government members will also be non-FACA consultants under SOMA. Their findings will be reported to the Science Panel.

There will be no change in the technical reviewers, who already were operating as consultants under the SOMA office. Their findings will continue to be reported to the Science Panel.

There will be no change in the cost reviewers, who are provided by the Program Offices. Their findings will continue to be reported to the Science Panel.



Process Improvement: No Other Significant Change

Evaluations:

Evaluation process continues to be based on the standard ROSES evaluation process. Each mission will have an assigned Lead Reviewer with 2 secondary reviewers. Major differences: (1) the result is a comparative review, so we must eliminate conflicts of interest prior to panel formation; and (2) we hold pre-panel meetings.

All-day telecon 2 weeks before mission presentations, to develop questions & topics for clarification by mission teams

Subpanels:

- Continue National Interests panel, chaired by Applied Sciences

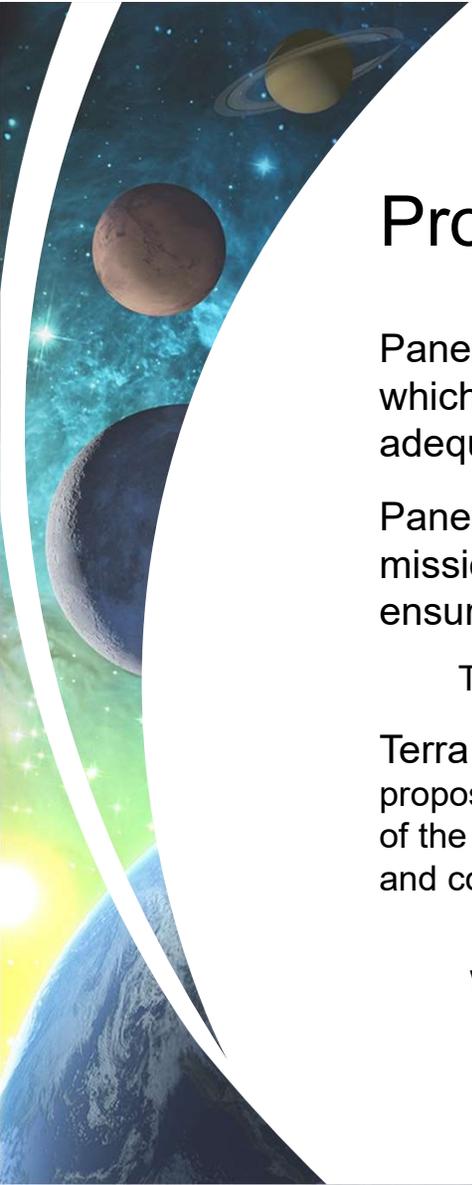
- Continue technical sub-panel, chaired by SOMA.

- Cost assessment will be led by the Program Offices, using the forms and evaluation approach developed in 2015 review.

Science Panel:

- Will continue pre-panel background briefings

- Chair and 1/3 to 1/2 the panel will have served on prior Senior Review panels, rest will be new.



Process Improvement: No Other Significant Change

Panel evaluation schedule follows the relaxed schedule introduced in the 2017 review which allowed more time between the sub-panels and the Science Panel to ensure adequate transmission of supporting evaluations.

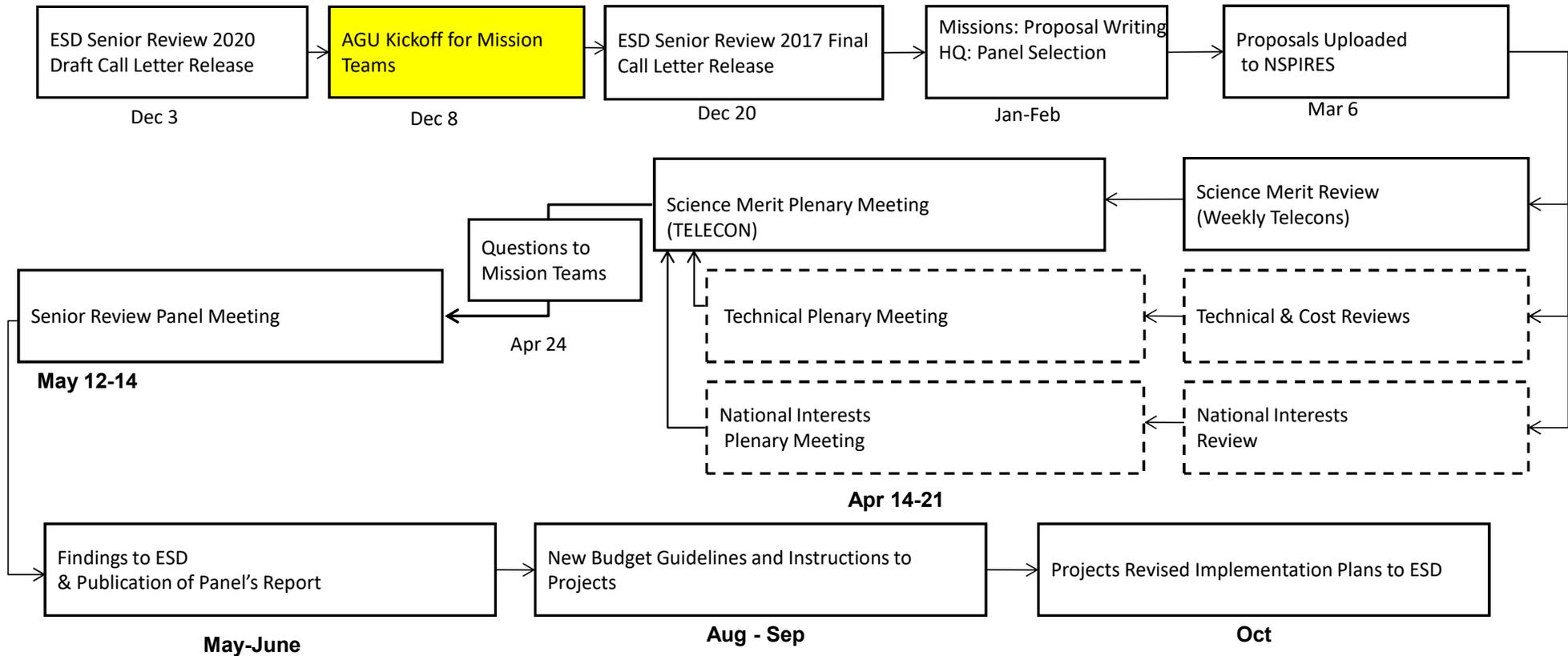
Panel questions to missions: HQ will work with the Chair to provide a core set that all missions will answer to keep the focus of the questions on useful information, and to ensure consistent level of input data across the missions.

Technical question answers may be provided separately to technical panel chair.

Terra & Aqua Existing Algorithms: Existing algorithm investigators will be asked to submit mini-proposals to be included in the Senior Review proposal, to facilitate grant renewal. The contributions of the mini-proposals to the mission will be summarized in the main body of the proposal. Format and content of the mini-proposals will be set by the Terra and Aqua Project Scientists.

Your Program Scientist is a resource to the Mission Team, as well as to the Panel. The PS will help clarify ESD priorities for the mission team, and facilitate the panel/mission interaction, as needed to ensure mutual understanding.

ESD Senior Review 2020 Flow



The background of the slide is a composite of two cosmic images. The top half features a dark blue and black space scene with a prominent blue nebula on the right and several bright, multi-pointed stars. The bottom half shows a similar scene but with a warm orange and yellow glow on the left side, transitioning into a greenish-blue nebula on the right. The text 'Call Letter Outline' is centered in a white, sans-serif font across a light blue horizontal band.

Call Letter Outline

Objectives

Extended Mission Scope

Evaluation Criteria (formerly Instructions to Panel)

Funding Environment

Schedule

The Senior Review Panels

Panel meetings

Presentations to Panel

Review Outcome

Instructions to Proposers

Science Section: science merit, data products, applied & operational use, programmatic elements (Terra & Aqua allotted 1 extra page to summarize mini-proposals)

Technical/Budget Section: technical status (inc. technical data appendix) & mission operations, budget narrative (inc. mandatory forms).

Appendices & Attachments (additional appendix for Terra & Aqua)

Proposal Submission

Attachments (e.g. WBS dictionary, budget templates)

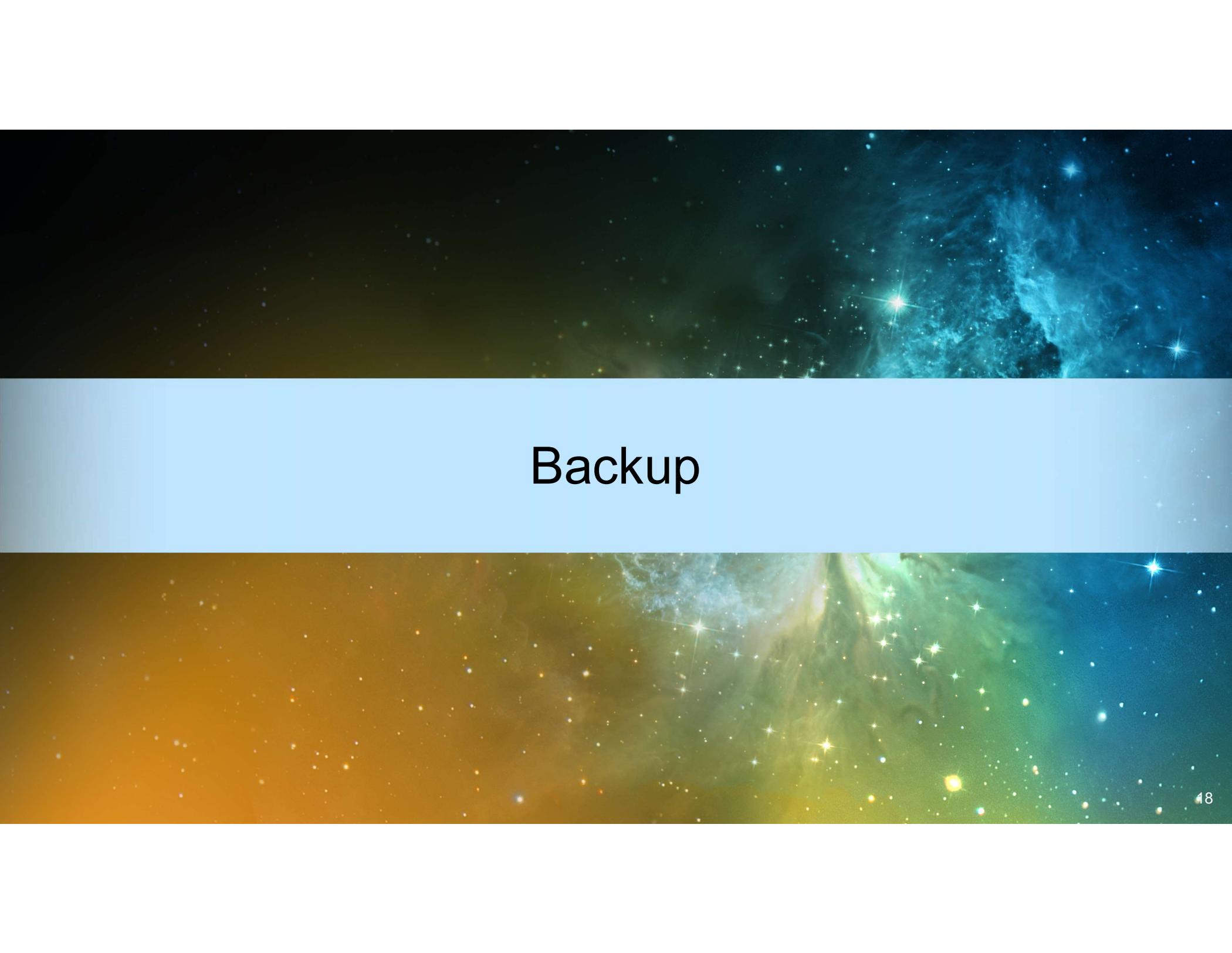
Proposal Format: Changed to one column last time at Reviewers' suggestion to facilitate e-reader use. New suggestion now to increase to 12pt font and increase page limits accordingly. Comments?



Questions, comments, suggestions?

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The background of the slide is a composite of two cosmic images. The top half features a dark space filled with numerous small stars and a prominent, glowing blue nebula on the right side. The bottom half shows a similar starry field but with a large, bright orange and yellow nebula on the left and a greenish nebula on the right. A light blue horizontal band is centered across the image, containing the text 'Backup'.

Backup

Decadal Survey Program of Record (2016)



2017 Decadal Survey Progress

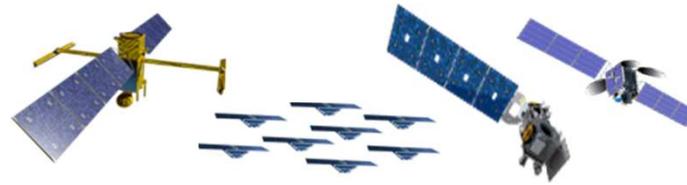


Earth Venture-Continuity

- DS recommended new Earth Venture Continuity Measurement strand (\$150M full mission cost cap)
- In December 2018, ESD released EVC-1 solicitation targeted for radiation budget measurements
- Proposals were received in July 2019

Earth Science Explorers

- DS recommended a new competed Explorer flight line with \$350M cost constraint
- Framework for program established
- Implementation on hold pending budget developments



Designated Observables

- DS identified 5 Designated Observables for mandatory acquisition (*Aerosols; Clouds, Convection & Precipitation; Mass Change; Surface Biology & Geology; Surface Deformation & Change*)
- In 2018 ESD initiated 4 multi-center Designated Observables studies, continued in 2019:
 - Combined: Aerosols-Clouds, Convection & Precipitation
 - Mass Change
 - Surface Biology & Geology
 - Surface Deformation & Change

Decadal Incubation

- DS calls for Incubation Program to mature specific technologies for important — but presently immature — measurements (preparation for next Decadal)
- Framework for program established
- Solicitations for Study Teams (PBL and STV) released on March 14, 2019, selections made, AGU Town Halls set up for each



Targeted Observables Priorities

Targeted Observable	Science/Applications Summary	Candidate Measurement Approach	Designated	Explorer	Incubation
Aerosols	Aerosol properties, aerosol vertical profiles, and cloud properties to understand their direct and indirect effects on climate and air quality	Backscatter lidar and multi-channel/multi-angle polarization imaging radiometer flown together on the same platform	X		
Clouds, Convection and Precipitation	Coupled cloud-precipitation state and dynamics for monitoring global hydrological cycle and understanding contributing processes	Radar(s), with multi-frequency passive microwave and sub-mm radiometer	X		
Mass Change	Large-scale Earth dynamics measured by the changing mass distribution within and between Earth's atmosphere, oceans, ground water, and ice sheets	Spacecraft ranging measurement of gravity anomaly	X		
Surface Biology and Geology	Earth surface geology and biology, ground/water temperature, snow reflectivity, active geological processes, vegetation traits and algal biomass	Hyperspectral imagery in the visible and shortwave infrared, multi- or hyperspectral imagery in the thermal IR	X		
Surface Deformation and Change	Earth surface dynamics from earthquakes and landslides to ice sheets and permafrost	Interferometric Synthetic Aperature Radar (InSAR) with ionospheric correction	X		
Greenhouse Gases	CO2 and methane fluxes and trends, global and regional with quantification of point sources and identification of source types	Multispectral short wave IR and thermal IR sounders; or lidar **		X	
Ice Elevation	Global ice characterization including elevation change of land ice to assess sea level contributions and freeboard height of sea ice to assess sea ice/ocean/atmosphere interaction	Lidar **		X	
Ocean Surface Winds and Currents	Coincident high-accuracy currents and vector winder to assess air-sea momentum exchange and to infer upwelling, upper ocean mixing, and sea-ice drift	Radar scatterometer		X	

** Could potentially be addressed by a multi-function lidar designed to address two or more of the Targeted Observables

Targeted Observables Priorities

Targeted Observable	Science/Applications Summary	Candidate Measurement Approach	Designated	Explorer	Incubation
Ozone and Trace Gases	Vertical profiles of ozone and trace gases (including water vapor, CO, NO ₂ , methane, and N ₂ O) globally and with high spatial resolution	UV/IR/microwave limb/nadir sounding and UV/IR solar/stellar occultation		X	
Snow Depth and Snow Water Equivalent	Snow depth and snow water equivalent including high spatial resolution in mountain areas	Radar (Ka/Ku band) altimeter; or lidar**		X	
Terrestrial Ecosystem Structure	3D structure of terrestrial ecosystem including forest canopy and above ground biomass and changes in above ground carbon stock from processes such as deforestation and forest degradation	Lidar**		X	
Atmospheric Winds	3D winds in troposphere/PBL for transport of pollutants/carbon/aerosol and water vapor, wind energy, cloud dynamics and convection, and large-scale circulation	Active sensing (lidar, radar, scatterometer); passive imagery or radiometry-based atmos. motion vectors (AMVs) tracking; or lidar**		X	X
Planetary Boundary Layer	Diurnal 3D PBL thermodynamic properties and 2D PBL structure to understand the impact of PBL processes on weather and AQ through high vertical and temporal profiling of PBL temperature, moisture and heights	Microwave, hyperspectral IR sounder(s) (e.g., in geo or small sat constellation), GPS radio occultation for diurnal PBL temperature and humidity and heights; water vapor profiling and DIAL lidar; and lidar** for PBL height			X
Surface Topography and Vegetation	High-resolution global topography including bare surface land topography, ice topography, vegetation structure, and shallow water bathymetry	Radar; or lidar**			X

** Could potentially be addressed by a multi-function lidar designed to address two or more of the Targeted Observables

Other ESAS 2017 Targeted Observables not allocated to a Flight Program element: Aquatic Biogeochemistry, Magnetic Field Changes, Ocean Ecosystem Structure, Radiance Intercalibration, Sea Surface Salinity, Soil Moisture

See: <https://science.nasa.gov/earth-science/decadal-surveys>

ESD has decided to treat Atmospheric Winds as Explorer